

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1.9
F7625T

TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION
UNIVERSITY FARM ST. PAUL 1, MINNESOTA

No. 299

How Shelterbelts Benefit Crops

Measurements made between 1935 and 1941 on over 300 fields in the Central and Northern Plains, each field protected by a shelterbelt, leave no doubt that shelterbelts result in increased crop yields, which will be more profitable if the belts are kept reasonably narrow. Attempt is made here to show how the benefits are produced, rather than their exact amounts. Much depends on the proper placement of field shelterbelts for most benefit, and such tree plantings will differ from the type ordinarily used to protect farmsteads.

There have been many theories as to why crops are benefited by shelterbelts, among the most common being that they reduce wind velocity and therefore reduce evaporation, thus conserving moisture. The crop increases are the result of "moisture conservation" in another sense, dependent on the occurrence of snowfall in large amounts, on the movement of snow, and on the mechanical effectiveness of the shelterbelt in holding snow.

In the Northern and Central Plains, shelterbelts benefit both corn and small grains (principally wheat). The greatest benefit is from a belt on the north side of a field. Next in beneficial effect are belts on the west, while belts to the south are third in effectiveness. Belts east of fields show some benefit, but barely enough to offset the injurious competition occurring in the narrow area close to the trees.

The commonest winter winds are from the northwest, with winds of highest velocity more northerly than westerly, as at Fargo, North Dakota. These winds largely determine where the most snow will lie, and crop benefits to the south and east of shelterbelts result from the normal drifting of snow into those areas. If there is no disturbing cross-wind, snow is "held" where it fell on a considerable area south of an east-west belt or east of a north-south belt. The crop area benefited may be as wide as 10 tree-heights or in a strip about 400 feet wide for an average belt 40 feet high.

Crop benefits to the north of shelterbelts are due partly to drifts formed to windward. Fields on both sides of a belt may be benefited, but for the best use of snow it should be "blown through" the belt and not remain too close to the trees. Tall belts with 3-5 rows of trees permit this and may show more uniform wind reduction than do the very "heavy" belts which are preferred for farmstead protection.

Snow-retention effects of shelterbelts are more pronounced in Northern Plains than to the south and indicate what may be expected in Minnesota. The results are probably not applicable west of the 100th Meridian.

July 1948

C. G. Bates, Silviculturist

